native and exotic, and of horticulturists' varieties, are cultivated in the Garden and Arboretum and the adjoining park, and the native flora easily accessible from St. Louis is large and varied. The herbarium, which includes nearly 250,000 specimens, is fairly representative of the vegetable life of Europe and the United States, and also contains a great many specimens from less accessible regions. It is especially rich in material illustrative of Cuscuta, Quercus, Coniferae, Vitis, Juncus, Agave, Yucca, Sagittaria, Epilobium, Rumex, Rhamnaceæ and other groups monographed by the late Dr. Engelmann or by attachés of the Garden. The herbarium is supplemented by a large collection of woods, including veneer transparencies and slides for the microscope. The library, containing about 8,000 volumes and 10,000 pamphlets, includes most of the standard periodicals and proceedings of learned bodies, a good collection of morphological and physiological works, nearly 500 carefully selected botanical volumes published before the period of Linnæus, an unusually large number of monographs of groups of cryptogams and flowering plants, and the entire manuscript notes and sketches representing the painstaking work of Engelmann.

The great variety of living plants represented in the Garden, and the large herbarium, including the collections of Bernhardi and Engelmann, render the Garden facilities exceptionally good for research in systematic botany, in which direction the library also is especially strong. The living collections and library likewise afford unusual opportunity for morphological, anatomical and physiological studies, while the plant house facilities for experimental work are steadily increasing. The E. Lewis Sturtevant Prelinnean library, in connection with the opportunity afforded for the cultivation of vegetables and other useful plants, is favorable also for the study of cultivated plants and the modifications they have undergone.

These facilities are freely placed at the disposal of professors of botany and other persons competent to carry on research work of value in botany or horticulture, subject only to such simple restrictions as are necessary to protect the property of the Garden from injury or loss. Persons who wish to make use of them are invited to correspond with the undersigned, outlining with as much detail as possible the work they desire to do at the Garden, and giving timely notice so that provision may be made for the study of special subjects. Those who have not published the results of original work are requested to state their preparation for the investigation they propose to undertake.

Under the rules of Washington University, persons entitled to candidacy in that institution for the Master's or Doctor's degree may elect botanical research work as a principal study for such degrees, if they can devote the requisite time to resident study.

WILLIAM TRELEASE,
Director.

ST. LOUIS, MO.

SCIENTIFIC LITERATURE.

THE GEOLOGY OF THE SIERRA NEVADA.

Geologic Atlas of the United States. U. S. Geological Survey; J. W. POWELL, Director. *Sacramento Folio*, Geology by W. LINDGREN. *Placerville Folio*, Geology by W. LINDGREN and H. W. TURNER. *Jackson Folio*, Geology by H. W. TURNER. Washington, D. C. 1894.

These three sheets are the first installment of a series covering the gold belt of California which has been in course of preparation for several years by the officers of the Geological Survey. It is needless to say that they form a very important and welcome contribution to our knowledge of the geology of California. Since the collapse of the old State Survey under Whitney,

but little effort has been made by California to elucidate her economic geology, notwithstanding the liberal appropriations which the State Legislature makes regularly for the maintenance of a so-called 'Mining Bureau.' In the knowledge of her geologic resources, California is far behind many minor States of the Union. It is therefore fortunate that the Federal authorities have so steadily prosecuted the inquiry into the geology of the gold belt of the Sierra Nevada and of other portions of northern California. The sheets under review are the results of this work. They form part of the geologic atlas of the United States and they are among the first dozen of the entire series. The mechanical execution of the folios challenges the admiration of all familiar with such work. In the opinion of the writer they compare very advantageously with the best European efforts of a similar kind. It is gratifying to American pride to see the beginnings of so vast a scientific project as a geologic atlas of the United States realized in a manner so eminently satisfactory. If there exists a doubt in the minds of the geologists of the country, and in this case the geologists speak for the people, as to the ultimate success of the project, it is based on the fear that there may not be in the future, as there certainly has not been in the past, a proper coördination of the topographic and the geologic branches of the survey. A correct topographic base is the *sine qua non* of a good geologic map; and unfortunately the topographer's conception of a correct map, in the present state of his professional education, is not what it ought to be. Thorough and conscientiously executed topographic surveys are expected of the geological survey. The ambitious extension of the topographic surveys *far* in advance of geologic investigation, at a rate which not only absolutely precludes the possibility of thorough work but demoralizes the topographer, can only bring serious discomfiture to the Geological Survey as a government institution.

The Sacramento, Placerville and Jackson folios bring out clearly the salient features of a section which may be taken as typical for the western slope of the Sierra Nevada. The Sierra slope rises from the eastern edge of the Great Valley of California to the crest of the range, some 60 miles distant at an inclination of less than 2°. It presents the characters of a gently tilted plain which has been incisively dissected by the streams which traverse it. This slope is underlain by two very different assemblages of rocks. The first of these is composed of sedimentary and eruptive formations which have been intensely disturbed, metamorphosed and invaded by vast intrusions of granitic magma, forming a complex whose eroded surface serves as the basement upon which the second assemblage reposes in little disturbed attitudes. The older assemblage is designated in the folios the 'Bed-rock' series, and the newer, the 'Superjacent' series. Neither of these terms is felicitous, although the first is based on popular usage and will appeal to the mining community. The Bed-rock series comprises the rocks which are known popularly as the *auriferous slates*, together with their associated eruptives and irruptives, and also the granitic rocks which invaded the series as a whole at the close of the Jurassic. It would be better if these granitic intrusions were not classed in the same category with the auriferous slates as part of a 'series.' The auriferous slates comprise the *Calaveras* formation (Carboniferous, with possibly some older Paleozoic) and the *Mariposa* formation. In the earlier Sacramento and Placerville folios, which are chiefly Lindgren's work, the Mariposa formation is colored as Cretaceous, while in the later Jackson folio by Turner the same formation is colored as Jurassic. The reference of this formation to two different horizons can scarcely be

taken as indicative of decided difference of opinion between these two geologists, but rather of a rapid change of opinion on the part of the officers of the survey in consequence of the recent paleontological determinations of Hyatt, whose results were probably not available at the time the earlier folios went to press. The Mariposa formation is of economic importance as that in which occurs the zone of auriferous veining which constitutes the famous 'Mother Lode.'

In a field so overburdened with igneous rocks, contemporaneous and intrusive, geologists will readily understand that many problems arise which are not easily answered by the most earnest efforts of the field geologist. The lack of definite statements as to the structural relations of the various sedimentary and igneous formations indicates that these relations are obscure and difficult to determine. Still, a brief statement from Messrs. Turner and Lindgren as to the interpretation of their structural sections would have been a desirable addition to the letter press, which is limited strictly to historical, petrographic and economic geology. For example: Are the two belts of the Mariposa slates on the Jackson sheet essentially synclinal troughs with an anticline bringing up a belt of the lower Calaveras between them? If so, the structure is comparatively simple, and the great body of amphibolite schist, diabase and porphyrite probably represents volcanic accumulations chiefly intermediate in age between the Calaveras and the Mariposa, but perhaps passing up into the latter. Or is the region traversed by a great system of longitudinal faults? A discussion of these and other tectonic questions we may doubtless expect in more detailed reports upon the geology of the region. But something of the tectonic should find a place in the folios to help out the sections. While alluding to the igneous rocks it may be well to mention that the user of the geological map is handicapped by not having the effusive rocks discriminated from the intrusive on the color scale. From the text it is apparent that many of the igneous rocks are clearly intrusive, while others are effusive. This discrimination should be expressed graphically, as it is impossible to understand the structure without keeping it in mind. The doubtful rocks should be grouped apart from those which are clearly effusive or intrusive. An extra convention or two to express doubt or ignorance on particular points would greatly enhance the scientific value of our geological maps.

One of the most important features of the Sierra Nevada slope is the invasion of the Calaveras and Mariposa formations by the Sierra Nevada batholite. The relations of the older rocks to this invading magma are beautifully brought out by the careful mapping of Messrs. Turner and Lindgren. Petrographically, the rocks of this batholite are chiefly of a type intermediate between granite and diorite, and are therefore designated as *granodiorite*. Other important facies of the same magma are granite, gabbro and gabbro-diorite. These rocks appear as great intrusive areas in the midst of the auriferous slates and establish pronounced zones of contact metamorphism in the latter. Putting the three geologic sheets together, and bearing in mind the distribution of these same granitic rocks to the eastward and southeastward of the area mapped, it is difficult to resist the suggestion that these rocks underlie practically the whole of the Sierra slope beneath the rocks through which they project as isolated masses. In other words, the mapping suggests strongly that if the plane of truncation effected by erosion had been lower a much larger proportion of granite would have been exposed, and if higher less. If this suggestion be accepted it follows that the Calaveras and Mariposa formations must have reposed upon the granodiorite magma

as a crust, up into which the magma advanced, not only by displacement, but absorption. For we have no trace apparently of the original basement upon which the Calaveras formation was deposited. In these relations of batholite to disturbed and metamorphic crustal rocks we have a striking analogy with the relations which obtain between the Laurentian granites and the metamorphic rocks of the Ontarian system in the Lake Superior region. The amphibolites and other schists of 'auriferous slates' are petrographically the same as many of the schists of the Ontarian system.

The invasion of the Jurassic and earlier rocks by the Sierra Nevada batholite seems to have been accompanied, or perhaps preceded, by uplift and the development of mountain structure. During early Cretaceous time these mountains were profoundly eroded, for on the edge of the valley of California we find the Chico Cretaceous, the earliest of the 'Superjacent' series, reposing upon the worn surface of the granodiorite. The Chico is followed by the Ione and later Tertiary formations. In part contemporaneously with the Ione, but chiefly at a later period, there were spread over portions of the region important sheets of gravel. Associated with these are flows of rhyolite and andesite. The rhyolite flows serve as a means of separating the 'older' from the 'later' gravels. The andesitic flows were contemporaneous chiefly with the first of the later gravels. These gravels constitute the once famous placers of California. Since they were spread over the Sierra slope, the latter has been tilted so as to accentuate the grade and intensify the downward corrasion of the streams. As a consequence of this corrasion, we now find only remnants of the gravels and volcanic flows reposing on the tops of nearly flat ridges between the river gorges.

Andrew C. Lawson.

University of California.

On the [Harvest Mice] Species of the Genus Reithrodontomys. By J. A. Allen. 8° May 21, 1895. From Bull. American Museum of Natural History, New York (pp. 107–143).

Dr. Allen has just published a much needed revision of the Harvest Mice—a group of small mammals differing from other murine rodents in having the upper incisors deeply grooved. Since Dr. Allen's study is based on upwards of 900 specimens (two-thirds of which belong to the rich collection of the U. S. Department of Agriculture) it is probable that future researches will add little to the results here published, so far as the United States forms are concerned. The name of the common species of the Carolinas is changed from *humilis* to *lecontei*. Fifteen species and subspecies are recognized, 12 of which inhabit the southern and western parts of the United States. Seven of the United States forms are accorded full specific rank. One of these, *R. montanus* of Baird, is known from the type specimen only, which was collected in Colorado more than 40 years ago and is in very poor condition. When additional specimens are obtained from the type locality it will probably displace one of the other species. Another, *R. arizonensis* from the Chiricahua Mountains, is separated from *R. longicauda* of California, chiefly on geographic grounds. In the case of one of the subspecies admitted—*R. longicaudus pallidus*—it is not likely that Dr. Allen will be followed by other mammalogists. Respecting this form he says: "I find myself greatly embarrassed as to which of three courses to pursue in the matter, namely: (1) To refer *R. pallidus* to *R. longicauda* as a pure synonym of the latter; (2) to treat *R. pallidus* as one of several local phases of *R. longicauda;* (3) to let the name stand in a subspecific sense for a generally dispersed paler southern form of *R. longicauda*, as opposed to true *longicauda* of the region from about Monterey

and Merced counties northward. Through lack of material for properly working out the problem I have provisionally adopted the latter course."

Since he has 175 specimens that he regarded as typical *longicauda*, and 157 that he referred to subspecies *pallidus*, or 332 in all, and since these 332 specimens came from no less than 70 localities scattered over the single State of California, it is a little difficult to understand what he meant by 'lack of material for properly working out the problem.' Furthermore, an examination of the localities assigned to the two alleged forms shows them to be hopelessly mixed—both being recorded from the San Joaquin Valley, and both from the coast region north of Monterey!

One of the largest and most highly colored members of the group is a new form from Louisiana, collected by the field naturalists of the Department of Agriculture. It is a northern representative of *R. mexicanus* and is named, from its color, *R. mexicanus aurantius*.

The paper as a whole is a critical and painstaking study of an obscure group. It is based in the main on ample material and is particularly welcome as adding another genus to those recently revised by American mammalogists. C. H. M.

NOTES AND NEWS.

THE REMEDY FOR PEAR BLIGHT.

THE writer desires to announce that a satisfactory method of preventing pear blight has been discovered. After prolonged investigation the complete life history of the microbe (*Bacillus Amylovorous*) has been worked out. Most of the cases of blight either come to a definite termination in summer or else kill the tree. When this is the case the blight dies out completely, there being no source of supply for the germs the following spring. In certain cases where it is a sort of even battle between the host and parasite, or where late infections in the fall have not run their course before cold weather comes on, the blight keeps alive in the tree. When root pressure increases in the spring, such cases start into activity and serve as sources of infection for the new growth. The removal of these sources of infection is the preventive remedy for pear blight. The work is best performed in autumn after all late growth has ceased, but while the foliage is still on the trees. At this season the dead leaves which persist on the blighted branches serve admirably to attract attention to the points of danger. The work can be done at any time during the winter up to the time of the beginning of growth in spring. Cutting out the blight in summer is unsatisfactory on account of the continued appearance of new infections. The matter will be published in full in a bulletin from the Division of Vegetable Pathology.

M. B. WAITE,

DEPARTMENT OF AGRICULTURE.

THE NEW YORK BOTANIC GARDEN.

THE sum of $250,000 for the New York Botanic Garden has now been subscribed as follows:

J. P. Morgan	$25,000
Columbia College	25,000
Andrew Carnegie	25,000
C. Vanderbilt	25,000
J. D. Rockefeller	25,000
D. O. Mills	25,000
Judge A. Brown	25,000
Wm. E. Dodge	10,000
Jas. A. Scrymser	10,000
Wm. C. Schermerhorn	10,000
Ex-Judge C. P. Daly	5,000
O. Ottendorfer	5,000
Samuel Sloan	5,000
George J. Gould	5,000
Miss H. M. Gould	5,000
John S. Kennedy	5,000
Wm. Rockefeller	5,000
Jas. M. Constable	5,000